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REMARKS

Reconsideration of the above-identified application in view of the amendments above and the remarks following is respectfully requested.

The office action of April 7, 2008 acted upon claims 45-64. Claims 45-64 were rejected under 35 USC, section 103 (a). By this response, claims 56-58 are canceled, without prejudice. Claims 45-55 and 59-64 are maintained, and new claims 65-69 have been presented, in the belief that all said claims recite allowable subject matter.

§ 103 Rejections

The Examiner has rejected claims 45-64 under § 103(a) as being unpatentable over the E.S.T. Electrolysis System brochure (henceforth, "E.S.T. brochure") in view of U.S. Patent No. 3,951,161 to Rohrback et al. (henceforth, "Rohrback"), "for reasons of record", and further in view of U.S. Patent No. 4,437,968 to Elliott, Jr. (henceforth, "Elliott").

The Examiner has rejected claims 52 and 64 under § 103(a) as being unpatentable over the E.S.T. brochure in view of Rohrback as applied to "claims above", and further in view of U.S. Patent No. 4,331,525 to Huba et al. (henceforth, "Huba"), for reasons of record.

The Examiner's rejections are respectfully traversed.

Previously presented claim 45 recites an electrochemical device for scale treatment in water supply systems, the device comprising: (a) an

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electrochemical cell including: (i) a metallic tank for receiving a water supply, said tank forming a cathode of said electrochemical cell; and (ii) at least one anode, disposed within said tank; said electrochemical cell for operatively connecting to an electrical power supply, said electrochemical cell operative to produce a pH above 12 near a wall of said tank, to form a scale deposition on said wall, thereby removing said deposition from said water supply; (b) an elastic scraper disposed within said tank, said scraper operative to scrape said wall of said tank; and (c) a control system for said elastic scraper, said control system adapted to activate said scraper to scrape said wall to promote said scale deposition on said wall, said scraper responsive to said control system, wherein said control system is adapted to activate said scraper to scrape said wall, based on both: (i) a measurement of an electrical property associated with a thickness of said scale deposition, and (ii) a pre-determined time parameter.

In the electrochemical device of the present invention, a voltage differential is maintained between the anode in the tank and the cathodic tank wall, to produce a pH above 12 near the wall, to form a scale deposition on the wall.

The scale deposition is removed by a scraper that is responsive to the control system. The control system triggers the scraper based on both: (i) a measurement of an electrical property associated with a thickness of said scale deposition, and (ii) a pre-determined time parameter.

Because the mechanism is electrochemical in nature, and because the electrochemical performance is known to be extremely sensitive to the

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thickness of the scale – an insulating material being deposited, the measurement of an electrical property that is correlated with the thickness of the scale deposition would be expected to provide – by itself – an accurate criterion for triggering the scraper. In Rohrback, by way of example, “measuring the contact resistance” is the sole parameter used to activate the control system (see inter alia, column 3, lines 38-46).

Brochure + Rohrback + Elliott

Rohrback does not contemplate, nor fairly suggest, the use of a time-based trigger for determining the formation of scale on a vessel wall, not instead of his disclosed electrical resistance-based technology, nor in addition to his disclosed electrical resistance-based technology.

The Examiner argues that Elliott “shows that one having ordinary skill in the art would by observation or by the automatic means such as a timer control the cleaning”.

Consequently, the Examiner argues, “the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the disclosure of the brochure and Rohrback with the teachings of Elliott, because Rohrback observes the buildup of scale by a measurement of an electrical property and the Elliott patent teaches the use of observation and/or automatic scraper to clean the surface from scale”.

Applicant does not understand the language and the logic of the Examiner’s argument. Nevertheless, Applicant respectfully traverses the

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rejection, and will present hereinbelow various points to overcome the argument, as best understood by Applicant.

Applicant understands that, according to the Examiner, the combined teachings of the brochure and Rohrback yield a system in which automatic scraping is triggered by Rohrback's electrical resistance monitoring technology. Rohrback himself does not teach, nor fairly suggest, the use of a timing mechanism for triggering scale removal. Elliott, however, teaches the use of a pre-determined time to automatically trigger the scraper to clean the surface from scale.

Why doesn't Rohrback consider the use of a pre-determined time to automatically trigger the scraper? For those skilled in the art of electrochemical scale deposition, the reasons are straightforward and manifest: time-based triggering is not based on any "on-line" monitoring of scale build-up, but, at best, on educated speculation on how thick the layer might be, as a function of time (e.g., based on some previous observation). Consequently, for processes that are particularly sensitive to scale thickness, time-based triggering is inferior to electrical resistance-based triggering, and a fortiori, to "on-line" electrical resistance-based monitoring and triggering.

Applicant respectfully argues that the Examiner has not demonstrated a genuine advantage to controlling scale thickness by introducing – *in addition to* the more reliable, physically meaningful electrical resistance-based monitoring and triggering, a second, relatively primitive, non-physically meaningful, time-based parameter. As such, such a mechanism would not cope with changes in

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composition, changes in feedwater flowrate, etc., thereby triggering the scraping mechanism too early, or too late, based on techno-economic system considerations. In what way would system performance be enhanced?

In actuality, a host of practical and significant engineering considerations known to those skilled in the art dictate against teach away from scraping the wall more frequently than deemed necessary by electrical resistance considerations. These include:

- wear/tearing of scraper/scraping mechanism;
- additional downtime in which the product -- treated water -- is not produced;
- the scraping operation is associated with a washing cycle to remove the scale from the treated water. Frequent scraping means frequent washing, resulting in:
 - (1) a significantly increased volume of waste effluent containing the scale particles, and
 - (2) a decrease in the volume of the product -- treated water;
- system cost;
- system complexity.

Thus, Applicant respectfully argues that employing a second parameter to scrape the wall more frequently than deemed necessary by electrical resistance considerations runs counter to the engineering common sense of those skilled in the art. A fortiori, employing a second parameter that is a primitive, non-

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physically meaningful, time-based parameter would not be obvious to implement, nor even obvious to try. There is no suggestion or expressed expectation of success in the prior art that would have led one to introduce an additional (clumsy and inferior) triggering parameter as a means of improving upon a known, accepted, sensitive measurement for triggering the scraper.

A closer look at the teachings of Elliott would appear to lend further support to these arguments.

Elliott discloses a steam-producing boiler that utilizes feedwater containing a relatively high concentration of impurities. The accumulated impurities are periodically removed from the boiler by means of a scraping mechanism. This mechanism is actuated manually, by observation of the scale, or periodically, by automatic timer control means, based on "simple observation, depending on the type of water or wastewater used in the boiler, the size of the boiler, and the like" (column 11, lines 57-60). Thus, Elliott effectively restricts his teachings to systems in which "the period may be readily determined by simple observation".

Rohrback, by sharp contrast, relates to extremely thin scale formation (column 7, line 65 – column 8, line 24). Moreover, it is an object of Rohrback to detect the onset of scaling or fouling, long before the deposit is visible (column 3, lines 28-30). Rohrback rejects visual inspection methods as being a "slow and insensitive" approach (column 3, lines 12-15). Elliott's teachings are even less sensitive, as the time period for scraper activation is determined in

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advance, and not by visual inspection each and every time the device is operated.

Similarly, the electrochemical device of the present invention is, as is manifest throughout the Specification, extremely sensitive to the electrical resistance contributed by the electrically-insulating layer of scale on the cathodic wall. The maximum thickness of the scale is 0.3 - 0.5 cm, and the optimal thickness is taught to be considerably less (see page 12 and page 15 of the instant Specification).

Thus, neither the Rohrback system nor the system of the instant invention can reasonably be considered systems in which "the period may be readily determined by simple observation".

Finally, Applicant respectfully submits that Elliott's art is significantly different from that of the instant invention. Elliott's art is the art of steam production using a boiler apparatus. The product —steam— is separated from the solid impurities by evaporation, and not necessarily by scale deposition. One skilled in the art will readily appreciate Elliott's tolerance for scale thickness would appear to be significantly higher than the tolerance in Rohrback or in the system of the present invention.

Moreover, Elliott's scale can precipitate in the bulk phase. This would be a disaster in the case of the instant invention, in which the object is to remove the scale from the water. The formation of a fine precipitate suspended in the water is highly undesirable, such that conditions must be such that the scale is deposited virtually exclusively on the cathodic wall.

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Thus, for any one of the reasons provided hereinabove, and a fortiori, for the combination of reasons, Applicant respectfully submits that the Examiner's rejections on §103 grounds are overcome.

In sharp contrast to the teachings of Rohrback, in which scale inhibition is the objective, and in which electrical contact resistance is the sole criterion for activating the scraping mechanism to clean the surface, the independent claims recite limitations relating to a control system adapted to activate the scraper according to a combined function including both (1) a measurement of an electrical property associated with a thickness of said scale deposition, and (2) a pre-determined time parameter. This combination is surprisingly efficacious, as disclosed in the instant Specification:

When the sole criterion for activating the scraper is electrical resistance, I have found that the rate of scale deposition often decreases with time. Without wishing to be bound by theory, I attribute this decrease to various surface effects on the crystalline scale surface, including sliming, which reduce the effective surface area of scale crystals that is available for enhancing additional scale deposition. Such surface effects appear to have little effect on electrical resistance.

Hence, by incorporating an additional criterion - that of maximum time elapsed between scrapings, the deleterious surface effects on the crystalline scale surface are curtailed, and the rate of scale deposition remains substantially constant over time.

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The prior art does not teach the source of the problem. In fact, neither the problem, nor the inventive solution embodied by the above-described limitation, is explicit, or fairly suggested, by the cited prior art.

Moreover, Rohrbach seemingly teaches away from the inventive solution, by asserting that electrical contact resistance, in and of itself, provides for extremely sensitive detection of scale formation (see, inter alia, column 7, line 31 – column 8, line 23), to the point that scale formation is readily detected even though no visible scale was apparent to the unaided eye (see, inter alia, column 26, lines 44 – 46).

Surprisingly, a highly superior rate of scale removal is achieved by the device and method of the present invention, as is explicitly disclosed in the instant Specification, inter alia, Table 1 (page 11) and the associated text, including page 15, line 14 – page 16, line 3. The Specification clearly articulates

... that control systems based both on electrical resistance (or another parameter correlated with scale deposition thickness) and time interval achieve superior results in terms of the rate of scale deposition on inner wall 20. Specifically, it has been found that by augmenting the electrical resistance criterion with a maximum time elapsed between scrapings criterion greatly improves the performance. [page 13, lines 6-11]

In summary, Applicant believes that the claims, as currently set before the Examiner, completely overcome the Examiner's rejections on § 103 grounds.

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New Claims

Support for new claims 65-69 can be found in the Specification and in the original claims. Specifically, the additional limitation in claim 65, "wherein said control system is adapted to activate said scraper to scrape said wall, when a measurement of an electrical property associated with a thickness of said scale deposition reaches a pre-determined value, and wherein, if prior to reaching said a pre-determined value, a pre-determined time from an immediately previous scraping is exceeded, said control system is adapted to activate said scraper to scrape said wall", is supported, inter alia, by the Specification, pages 13-14. This language more clearly defines the relationship between the "measurement of an electrical property" and the "pre-determined time" in the activation of the scraper by the control system.

In view of the above amendments and remarks it is respectfully submitted that the instant claims are in condition for allowance. Prompt notice of allowance is respectfully and earnestly solicited.

Respectfully submitted,

Gabi Elgressy

Date: October 7, 2008